

Property, exclusive of crops.....	\$2,000
Crops.....	4,000
Erosion of farm lands.....	1,000
Suspension of business.....	5,000
Total.....	\$12,000

The value of property saved thru the warnings was \$10,000.

The lower Missouri and upper Mississippi rivers were at moderate stages thruout the month, while the annual rise in the lower Mississippi River set in at New Madrid, Mo., on the 9th, reaching the flood stage of 34 feet on the 27th.

ICE.

The Missouri River opened at Omaha, Nebr., on the 27th, but remained closed above. Below Omaha it was opened during the greater portion of the month, and no ice of consequence was observed below the mouth of the Osage River. There was but little change in the Mississippi River, the ice

continuing solid as a rule above Davenport, Iowa. No ice was observed below New Madrid, Mo.

There was some increase in the thickness of the ice in the upper Missouri River, with a maximum of 32 inches at Bismarck, N. Dak., an increase of 8 inches during the month. There was but little change in the upper Mississippi River, while in northern New England there was a little more ice than during January, 1909.

The highest and lowest water, mean stage, and monthly range at 198 river stations are given in Table IV. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—H. C. Frankenfield, *Professor of Meteorology.*

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

NOTES FROM THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN, Librarian.

THE ISOTHERMAL LAYER OVER EQUATORIAL AFRICA.

The most interesting piece of news that has come to us from meteorological circles abroad since the last installment of these notes was written is the announcement that the recent German aerological expedition to East Africa (See MONTHLY WEATHER REVIEW, December 1908, p. 422) found the isothermal or relatively warm stratum of the high atmosphere over Victoria Nyanza. This and other results of the expedition are published in the January, 1909, number of the Quarterly Journal of the Royal Meteorological Society in a communication from Doctor Assmann, director of the Royal Prussian Aeronautical Observatory at Lindenberg, dated January 31, 1909.

The isothermal layer was reached by two ascents of sounding-balloons, at altitudes of 65,000 and 56,000 feet (19,800 and 17,000 meters). It will be remembered that the *Otaria* expedition, sent out by Messrs. Rotch and Teisserenc de Bort, failed to reach this layer over the equatorial regions of the Atlantic, tho some of their balloons rose to nearly 50,000 feet; but Rotch and others have confidently predicted that it would be found in equatorial regions as soon as balloons could be raised to a sufficient altitude. We may now safely conclude that this phenomenon is common to all latitudes, having its greatest elevation in the neighborhood of the equator and its least over the poles.

Especially remarkable, says Doctor Assmann, is the great average decrease of temperature with altitude found over Lake Victoria; the lowest temperature encountered at 65,000 feet (19,800 meters), was -119°F. (-84°C.), with a temperature at the ground (3,800 feet, or 1,150 meters, above sea level) of 79°F. (26°C.). The variability of the temperature at high levels is enormous in equatorial, as well as in higher latitudes. Two ascents gave readings at 56,000 feet (17,000 meters) of -105°F. (-76°C.) and -62°F. (-52°C.), respectively.

In addition to the ascents of sounding-balloons a number of small pilot-balloons were sent up to great altitudes to explore the direction and velocity of the upper air currents, and these showed the presence of an uppermost current of air blowing nearly from due west, and flowing above the regular easterly current of the equatorial region. A similar discovery was made some time ago at Cairo, Egypt, by B. F. E. Keeling, as recorded in these notes last June.

The ascents over Lake Victoria were made from a low-powered launch, and would have yielded better results had a faster boat been available. It is stated that with a vessel having a speed of some 12 miles an hour this lake is the best place in the world for sounding-balloon ascents, because the

winds are generally feeble enough to permit the recovery of all the balloons sent up.

THE METEOROLOGY OF ABYSSINIA AND THE NILE FLOOD.¹

Another African expedition of much interest was that sent to Addis Abbaba, the capital of Abyssinia, in May, 1907, by the meteorological service of Egypt, to study the meteorological conditions controlling the Nile flood. As pointed out in these notes some years ago,² the Nile flood is a faithful index to the rainfall of Abyssinia, since the Blue Nile, when in flood, holds back the water of the White Nile, so that the contribution of the latter to the flood is negligible. Thus the meteorology of Abyssinia, the country in which the Blue Nile takes its rise, is a matter of great interest to the people of Egypt.

The chief rainfall was found to be associated with thunderstorms. Nevertheless, tho accounts from all parts of Abyssinia agree that the intensity of electrical phenomena was much greater in 1907 than it had been for years, a condition favoring heavy rainfall, the latter was actually much lighter than usual—as shown by the very low flood of that year. This contradiction is explained by the statement that the rain-bearing winds were much weaker than usual. While the atmospheric circulation in this part of the world calls for much further investigation, the author of the memoir under discussion states confidently that the moisture precipitated over Abyssinia comes all the way across the African Continent from the South Atlantic Ocean. The writer adds:

This theory bears on only one factor of the rainfall, the supply of moisture. The velocity of the current would still be in great part determined by the isobaric gradients of the great monsoon depression, and finally the convectional ascensional movement would probably require separate discussion.

A much more elaborate report on the results of this expedition is in preparation.

THE WEATHER SERVICE OF THE FRANKFORT AERONAUTICAL EXPOSITION.

Dr. F. Linke announces in *Illustrierte aeronautische Mitteilungen* that the Geophysical Institute of the Physical Society of Frankfort-on-the-Main has undertaken to organize a special weather service for the Frankfort Aeronautical Exposition (July–October, 1909). Telegrams from the whole of Europe will be received twice a day and two weather maps drawn. Observations from the higher strata of the atmosphere will also be obtained. Of course the conditions over Frankfort will be of first importance. An aerological station will be established in Frankfort, where once or twice a day soundings of the lower layers of the atmosphere will be made by means of kites or captive balloons with self-registering instruments.

¹ Craig, J. I. A meteorological expedition to Addis Abbaba, in 1907. Alexandria, 1909. (Reprinted from the "Calro scientific journal," No. 27, 1908.)

² Monthly Weather Review, May, 1906, 34 :228.

Finally, in the neighborhood of Frankfort, to a distance of perhaps 100 kilometers, stations will be located, whence warnings will be sent to the weather service station at this place of the approach of thunderstorms and squalls and, after they have past, reports by telegraph of the time and direction of path. By means of such despatches the time when such storms will reach Frankfort can be calculated with tolerable accuracy. Signal stations will be located at conspicuous points, from which storm warnings can be sent to balloons and other aircraft by means of optical signals; possibly also by wireless telegraphy.

Doctor Linke does not exaggerate the importance of this project when he says:

The wider object of this organization is, of course, the acquisition of knowledge and experience for the coming era of aerial navigation; the consummation of which, on account of the uncertainty of atmospheric conditions, is impossible without the previous improvement and extension of the weather service. That such an undertaking will at the same time increase our knowledge of atmospheric processes and thereby improve the accuracy of the forecasts, is evident. *Aeronautics and meteorology support each other, neither can dispense with the other.*

It is perhaps not too much to say that the execution of this project will mark the beginning of a new era in practical meteorology—an era in which, ultimately, all the weather services of the world will be called upon to extend the benefits of their forecasts and warnings to the navigators of the air. The development of aeronautics means the enhancement of the importance of meteorology among the sciences and in the domain of practical affairs. The rapid progress that this art has made within the last few years must, therefore, be a source of gratification and encouragement to all meteorologists.

THE ARGENTINE METEOROLOGICAL STATION IN THE SOUTH ORKNEYS.

The corvette *Uruguay*, of the Argentine Navy, left Buenos Ayres on January 14 for the meteorological and magnetical station at the South Orkneys. The relief party sent out by the Argentine Meteorological Office consists of four members, under the command of Mr. A. Lindsay, of Edinburgh, who received his early meteorological training at the Ben Nevis Observatory, and who for the past year has been in charge of the new meteorological observatory established at Port Madryn, in the territory of Chubut [Argentina]. The observations at the South Orkneys this year are likely to prove of unusual interest and importance owing to the comparative proximity of the Charcot expedition, which is to winter in the vicinity of Alexander Land. On the return voyage of the *Uruguay* a stop is to be made at Moltke Haven, South Georgia, in order to make magnetic observations in the same spot as that previously occupied by the German International Expedition of 1882-83. This work is intrusted to Mr. W. R. Bruce, chief last year at the South Orkney station, who, along with the rest of the party, returns with the *Uruguay*. The data from South Georgia will be of great value in connection with the elaborate magnetic survey of the Argentine Republic and adjacent regions which has been in progress for some years.—*Scottish Geographical Magazine*, March, 1909, p. 151.

AN INVERTED RAINBOW.

On April 9, 1908, an inverted rainbow was seen from the Italian geodynamic observatory of Rocca de Papa, by Professor Agamennone, the director of the observatory, and a party of visitors. The morning was showery; and when the visitors reached the observatory, 2,500 feet above sea level, and looked down on the vast Campagna, they were astonished to see projected on the vineyards and trees beneath a perfect rainbow, with its convex side down and its middle point bearing northeast. Inverted rainbows are very rare even in mountainous regions. None of the visitors, who were French and Italian meteorologists, had ever seen one, nor had Professor Agamennone, altho he had been director of the observatory for eight years. The phenomenon, however, is not unknown. It was observed from the Eiffel Tower, in Paris, in April, 1891.

In this case there was a double rainbow, extending above and below the horizon to form two nearly complete concentric circles.—*Scientific American*, March 20, 1909, p. 219.

PRIZE OFFERED BY THE SCOTTISH METEOROLOGICAL SOCIETY.

The Scottish Meteorological Society offers, thru its council, a prize of £20 for the best essay on a meteorological subject. As an indication of the kind of essay the council are prepared to consider, the following subject may be mentioned:—

"A discussion of the extent to which the heat set free when water vapor is converted into the liquid state influences the temperature of the atmosphere, with special reference to the climatology of different parts of Scotland."

The council, however, wish it to be clearly understood that an essay on any subject will be equally eligible.

The following are the conditions on which the prize is offered:—

1. The competition shall be open to regular matriculated students of the four Scottish universities, including University College, Dundee, who have attended classes of mathematics and natural philosophy, or to graduates of the Scottish universities who at 1st January, 1910, shall be of not more than five years' standing.

2. The essays must be lodged with the secretary to the Scottish Meteorological Society, 122 George street, Edinburgh, on or before 31st March, 1910, with a statement of the candidate's qualifications to compete.

3. All essays must be legibly written, or typewritten, on one side of the paper only.

4. The council of the Society shall appoint a referee or referees to report on the essays, and the decision of the council as intimated by the secretary shall be final.

5. The council reserve the right to publish the successful essay in the Society's Journal. The other essays will be returned to the competitors.

R. T. OMOND,
E. M. WEDDERBURN,
Joint Honorary Secretaries.

DR. SERENO BISHOP.

We regret to learn of the recent serious illness and death, January, 1909, of Dr. Sereno E. Bishop at Honolulu, H. I. For more than a year Doctor Bishop had been partially paralyzed, altho his general bodily health has been good. Almost the last of his intelligent activities were his observations of the skies at the end of 1908, when he noted the haze, Bishop's ring, and some sky-glows too brilliant for the average atmosphere.—*C. A.*

SUMMARY OF ICE CONDITIONS OF THE GREAT LAKES.

By NORMAN B. CONGER, Marine Agent. Dated Detroit, Mich., March 2, 1909.

The reports from the regular and display stations of the U. S. Weather Bureau indicate that there is much less ice in all the lakes than was reported last season. In Lake Superior, the western end is covered with a field extending out about 20 miles; small fields are reported over the central and eastern portions. The ice in Whitefish Bay is solid. Solid ice is reported the entire length of St. Marys River. In Green Bay the ice averages from 10 to 22 inches and is solid. In Lake Michigan the fields are small and much broken up. There are not as many fields reported over the northern portion. At the Straits of Mackinac the ice is heavily windrowed in places, and where smooth is about 20 inches in thickness. In Lake Huron the fields are reported to the north and east of Thunder Bay Island. The ice is not heavy. No fields are reported over the southern portion. Lake St. Clair is reported covered with about 7 inches of ice, with probably some open